REMARKS

Claims 1-23 are pending in the application Claims 1, 8-9, 15-16, 18, and 21-22 have been amended. Further, claim 23 is newly added to the application. No new matter has been added as a result of this amendment.

Rejection Under 35 U.S.C. § 1.12, (second paragraph)

Claims 8-9, 18, and 21-22 have been rejected for allegedly being indefinite in view of the recitation of the term "thermal budget" in claims 8-9 and 21-22. This rejection is overcome in view of the amendment of these claims in which the thermal budget is recited in the context of a relative quantity. As described by the applicants' in their specification, "thermal budget" means the application of a given temperature for a given time. (Specification, pg. 8, ll. 11-22). By amending the claims to recite a first thermal budget and a second thermal budget, and further to recite the relative relationship of the first and second thermal budget, the claims now recite a functional relationship associated with thermal amounts determined by time and temperature.

Claim 18 was rejected for recitation of the relative terms "flexible or rigid" in relation to the recited support. This rejection is overcome in view of the cancellation of the terms from the claim.

Rejection Under 35 U.S.C. § 1.02 (b)

Claims 1, 4-7, 10, and 13-20 have been rejected over JP 11087668 to Kenji. This rejection is overcome in view of the amendment of claim 1, together with the following remarks.

Claim 1 recites a method for fabricating a thin layer by implanting a first chemical species in the substrate at a first depth. At least one second chemical species is implanted in the substrate at a second depth. The second depth is different from the first depth. The difference in implantation depths gives rise to the step of diffusing at least a portion of the at least one second chemical species from the second depth to the vicinity of the first depth.

The applicants' assert that Kenji does not suggest or disclose the method recited

by claim 1. This is at least because Kenji implants chemical species into the same region of the substrate. The applicants refer to the English machine translation of the Japanese text submitted with their Information Disclosure Statement of January 25, 2007. In the machine translation, paragraph 0009 describes the implantation of helium ion, (H_e^+) or molecular hydrogen ion (H_2^+). The ion implantation region (11b) is described as formed in parallel with the oxidizing zone (11a). The applicants note that in the examples of implantation presented by Kenji, helium ions are implanted at 90keV and molecular hydrogen ions are implanted at 120keV. (See translation, para. 0012). Accordingly, the applicants assert that the helium ions and molecular hydrogen ions are implanted in close proximity to one another.

In contrast to the process disclosed by Kenji, the applicants implant species at different depths in the substrate and subsequently diffuse a second chemical species to the vicinity of the first chemical species. The difference in implantation depth can be appreciated from the applicants' specification, in which the applicants describe and illustrate the diffusion of chemical species from a secondary depth peak 3 to the level of a main peak 5. (See Fig. 3b, and pg. 9, ll. 30-35, pg. 10, ll. 1-15). By way of comparison, the applicants describe an embodiment of their invention in which helium atoms and hydrogen atoms are implanted in a silicon substrate. (Pg. 13, ll. 10-29). In the disclosed embodiment, helium is implanted at an energy of 180keV, while hydrogen is implanted as an energy of 75keV. This compares to the disclosure of Kenji in which helium is implanted at 90keV, while molecular hydrogen is implanted at 120keV. The applicants' note that the implantation energy for single hydrogen ions would be less than that needed for molecular hydrogen ions.

In contrast to Kenji, the applicants implant energy for helium is more than twice that of the hydrogen ion implantation energy. Accordingly, the applicants' assert that Kenji does not suggest or disclose implanting first and second chemical species at different depths, such that one of the chemical species can be subsequently diffused to the region of the other chemical species.

The applicants have amended claim 1 to further distinguish the recited process from Kenji. In particular, the step of implanting at least one second chemical species is carried out at an atomic concentration higher than the atomic concentration of the first

chemical species. This implantation step is in contrast to the relative concentrations of chemical species imployed by Kenji.

Kenji discloses the implantation of molecular hydrogen ions. Accordingly, each molecular hydrogen ion (H_2^+) has two hydrogen ions (H^+). Thus, when reading an implantation dose for molecular hydrogen ions, that dose is equivalent to two times the hydrogen ion dose. This distinction is noted by Kenji in paragraph 0009 of the machine translation. As far as understood from the machine translation, all of the values for hydrogen dose set forth in Kenji are for the molecular hydrogen ion. Accordingly, in all instances the hydrogen ion concentration is substantially greater than the helium concentration.

In the applicants' claimed method, the second chemical species is implanted in a concentration higher than the first chemical species and the second chemical species is subsequently diffused to the vicinity of the first chemical species. The process of Kenji fails to suggest or disclose the concentration relationship in which first ions are always present in a concentration substantially higher than second ions.

The applicants assert that their claim sets forth a relationship in which the second chemical species is less effective than the first chemical species at weakening the substrate. In contrast, Kenji discloses a process in which the less effective chemical species (helium) is introduced at a concentration below that of the more effective chemical species (hydrogen). This is the reverse of the concentration relationship recited by the applicants in claim 1. As explained by the applicants, the implantation of the first chemical species localizes the fracture that will subsequently be initiated and allows the transfer of a thin surface layer. The second species provides a reservoir that can migrate to the fracture cite to facilitate the fracture of a substrate. (See, for example, pg. 6, ll. 31-35, pg. 7, ll. 1-24). The migration of a second species to the fracture zone allows the growth of microcavities, without increasing the size of the disturbed region. This results in an improved process in which a precise fracture of the thin film occurs. (See, for example, pg. 12, ll. 5-31, pg. 13, ll. 7-29).

Claims 4-7, 10, and 13-20 are allowable in view of their direct or indirect dependence from claim 1. Further, claims 15 and 16 have been amended to improve their form by correcting a typographical error in claim 15 and by providing proper

antecedent basis for the recited chemical species in claim 16.

Rejection Under 35 U.S.C. § 1.03 (a)

Claims 2-3 have been rejected over Kenji in view of Wang. This rejection is overcome in view of the following remarks.

The applicants note that the Examiner acknowledges that Kenji does not disclose implantation of a second species at a depth that is greater than or less than the first depth. (Office Action, pg.4). Wang discloses the implantation of Group V ion species into a Group III-V compound semiconductor, followed by implantation of Be ions. Figure 2 of Wang illustrates the distribution of phosphorus and beryllium in which the phosphorus and beryllium are implanted at different energies.

The applicants assert that, while it is known to implant chemical species at different energies, the combination of Wang with Kenji does not suggest or disclose their claimed invention. Neither Kenji nor Wang suggest or disclose a method of thin film formation in which first and second chemical species are characterized by different effectiveness's at weakening a substrate, and are implanted at different depths in the substrate, followed by diffusing the less effective chemical species to the vicinity of the first depth in which the more effective chemical species resides.

Claims 11 and 12 have been rejected over Kenji in view of Chu et al. This rejection is overcome in view of the following remarks.

As acknowledged in the Office Action, Kenji does not disclose the use of mechanical stress to initiate a fracture in the wafer. (Office Action, pg. 5). Chu et al. disclose a method of forming a transferrable device layer in a crystalline porous release layer and bonding the transferable device layer to a insulating substrate. Chu et al. disclose a number of prior art processes for forming silicon-on-insulator (SOI) substrate. The disclosed method focuses on an epitaxial layer transfer technique referred to as ELTRAN. The applicants assert that the addition of Chu et al. does not overcome the deficiency of Kenji. This is at least because neither reference suggest or discloses the implantation of first and second chemical species at different depths, in which the second chemical of species is subsequently diffused to the area of the first chemical species and initiating a fracture along the implantation depth of the first chemical

species.

The applicants have a made a novel and nonobvious contribution to methods for fabricating thin film layers. The claims at issue distinguish over the cited references and are in condition for allowance. Accordingly, such allowance is now earnestly requested.

Respectfully submitted,

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